DOE Transmission Reliability Program Peer Review

DER Support for a Reliable Electric Grid in a Competitive Market

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University of Wisconsin & Georgia Institute of Technology

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Project Value - The Research Goal is as Follows…

Identify and develop system integration tools and techniques

to permit reliability-enhancing operation of

large numbers of

small (< 500 kW) distributed energy resources

in the distribution system.

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Project Organization and Management System

- Management Steering Function – Margie Tatro (oversight and strategic direction)
- Program Office – Joe Eto (project coordination, DOE Program Manager interface, budget and milestone tracking, information management)
- Technical Leads – Bob Lasseter and Abbas Akhil (technical leadership and external interfaces)
- Research Performers – John Stevens (protection); John Kueck (energy manager); Bob Yinger (microturbine testing); Ross Guttromson (transmission system impacts); Sakis Meliopoulous (distribution system modeling); Chris Marnay (customer adoption model)
- Process – planning, internal reviews, external reviews

Past Accomplishments

Report Card

Funding: $2.8 million through FY02

Accomplishments

➢ Surveyed Test Locations and Implemented DER test bed at UC Irvine	2000
➢ Created Steady State & Dynamic Models of Loads & Micro-Sources	2000
➢ Developed (with CEC) prototype DER Customer Adoption Model	2000
➢ Developed Sag Controls for MicroGrids	2001
➢ Characterized micro sources (microturbines)	2001
➢ Defined and socialized Microgrid Concept (12+ presentations)	2001
➢ Assessed status of existing modeling tools	2001
➢ Developed tool for multiphase power flow assessment	2001
➢ Developed strong relationships with partners UCI, NRECA, AEP, CEC	2000-2

http://certs.lbl.gov/DER_Integration.html

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Four Activities Underway in FY02

FY02 Resources

- $500K

Key Projects/Deliverables

- Disseminate MicroGrid design and begin planning MicroGrid demonstration projects (with partners)
  - Determine test objectives, select sites, perform droop control tests with commercial MTG systems. Work toward a 10MW in FY05.
- Assess business case for MicroGrid (including combined heat and power)
- Develop conceptual control and protection schemes for MicroGrid integration with grid of the future
- Develop and commercialize design tools

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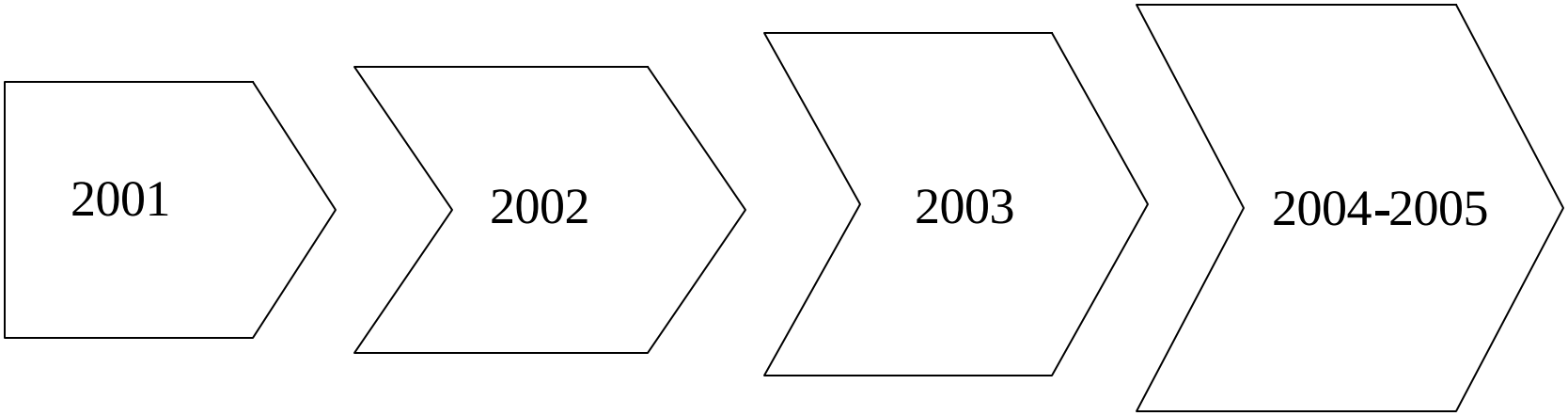
Future Plans Call for Increased Partnerships and Leveraging



Validate integration concept. Conceive analysis tools.

Design protection and control concepts and prototype at component level. Complete business case analysis.

Implement protection and control concepts at demo site. Prove protection architectures to distribution utilities.

Demonstrate at customer/power park level. Show transmission system impacts.

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Partnerships Are Essential

Collaborators:

- California Energy Commission
- Capstone
- University of California, Irvine
- American Electric Power
- National Rural Electric Cooperative Association
- Northern Power Systems

Research Performers:

- 8 CERTS Organizations (see cover slide for listing)

Information Sharing:

- EPRI PEAC
- National Renewable Energy Laboratory

Partnership to Test the MicroGrid Concept

- **Partners:**
  - Capstone Microturbines, Northern Power Systems, American Electric Power
- **Goals:**
  - 2 years: Demonstrate feasibility of functional concepts through tests at a "utility" test site – voltage control, protection, transition to island, etc.
  - 3 years: Build and operate a prototype MicroGrid at a user site
- **Milestones and Schedule:**
  - Negotiate scope of work, schedule and cost for MicroGrid demonstration with CEC (May 30)
  - Complete modifications to 3 Capstone machines
  - Initiate testing at the test site
  - Complete the demonstration of key control and protection issues at test site using the 3 modified Capstone machines
- **CERTS Responsibilities:**
  - Define functional requirements for Capstone modifications
  - Develop test facility requirements and test plan for test sites
  - Manage Capstone and test site contracts

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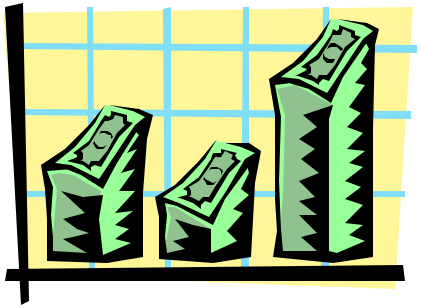
DOE has a Strong Collaborator – the California Energy Commission



	DOE	CEC
FY99	$ 800K	
FY00	$ 700K	
FY01	$ 750K	$ 550K
FY02	$ 500K	$ 1,250K
TOTAL	$ 2,800K	$ 1,800K